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Description of the Dominant Species of the Class Demospongia Dredged from the Coastal Area of the Izu Peninsula, Sagami Bay*

By

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星野孝治**：伊豆半島沿岸（相模湾）より得られた数種の尋常海綿

Under the programme, "Research on the natural history of Fuji-Hakone-Izu Area" sponsored by the National Science Museum, the author had an opportunity to study demosponges collected from the coastal area on the eastern side of the Izu Peninsula in Sagami Bay. The materials treated in this report were dredged from a depth of 50–120 m by the research vessel "Tsukuba" of the Shimoda Marine Research Center of the University of Tsukuba on Oct. 19 and Nov. 9 and 12, 1981. Although a total of eleven species were this report only four species will be discussed. These four are dominant in this coastal collected, in area and interesting from a taxonomic standpoint.

Three of the four species are new to science. The fourth is a common species along the Pacific coast of Japan, but problematic with respect to its taxonomic relationships.

Hitherto, the taxonomy of demosponges from the present research area has not been reported. However, demosponges from other areas of Sagami Bay have been the subject of many important taxonomic works including: DÖDERLEIN's (1883) studies off Enoshima Island and Misaki district; CARTER's (1885) work in Misaki; LAMPE (1886) in Misaki; RIDLEY and DENDY (1887) on Izu-Oshima Island; SOLLAS (1888) in the central region of Sagami Bay; THIELE's (1898) work mainly in Enoshima and Yogashima (?); LEBWOHL (1914a, 1914b) in Okinose, Doketsuba and other areas; TOPSENT (1928, 1930) in an uncertain locality in Sagami Bay; KADOTA (1922) in Misaki; and TANITA (1970) in the neighboring area of Enoshima.

These authors have described a total of 107 species of demosponges from Sagami Bay. Because it is an area of contact between cold and warm water elements, Sagami Bay occupies a fairly unique position along the Pacific coast of Japan from a zoogeographic viewpoint. The present study on the demospongian fauna of Sagami Bay may, therefore, provide an interesting contribution to the zoogeography of this important group.

The four species described in this report are as follows:

Class Demospongia SOLLAS, 1885

Subclass Tetractinomorpha LEVI, 1953

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Order Astrophorida LEVI, 1973

Family Theneidae SOLLAS, 1886

1. *Thenia shimodensis* n. sp.

Order Spirophorida LEVI, 1973

Family Tetillidae SOLLAS, 1886

2. *Craniella ellipsoidea* n. sp.

Order Hadromerida TOPSENT, 1894

Family Spirastrellidae RIDLEY et DENDY, 1886

3. *Spirastrella panis* THIELE, 1898

Subclass Ceractinomorpha LEVI, 1953

Order Haplosclerida TOPSENT, 1928

Family Adociidae DE LAUBENFELS, 1936

4. *Orina izuensis* n. sp.

Localities where specimens of each species were dredged and their relative abundance are indicated in Table 1.

Table 1. Sampling sites and relative abundance of each species.

Station	Depth	Location*	<i>T. shimodensis</i>	<i>C. ellipsoidea</i>	<i>S. panis</i>	<i>O. izuensis</i>
4	51-80 ^m	34°39.7'N 139°02.1'E			+	
11	93-100	34°41.0'N 138°01.1'E	++++	++		
12	92-102	34°41.0'N 138°01.1'E	+++++	+++		
15	50-60	34°41.1'N 138°00.2'E	+++	++++		++
16	53-60	34°41.1'N 138°00.2'E	+++	+++		++
17	63-70	34°39.9'N 138°00.1'E	+	++		
18	60-68	34°39.9'N 138°00.4'E	+			
24	59-64	34°37.4'N 138°58.0'E	+			
26	97-106	34°41.0'N 139°00.8'E	++	++		
28	95-106	34°41.0'N 139°01.1'E	++			
29	50-59	34°41.1'N 139°00.0'E	++++	++++		
30	50-55	34°41.1'N 139°00.0'E	++	+		
31	102-120	34°40.9'N 139°01.0'E	++	++		

* Latitude and longitude of starting positions for dredge hauls which were several hundreds to one thousand meters in length and directed towards the coast of the Izu Peninsula. Number of individuals collected: +, 1-5; ++, 6-25; +++, 26-50; +++, 51-100; +++, more than 101.

Description of Species

1. *Thenia shimodensis* n. sp.

(Text-fig. 1 and Pl. 7, figs. 1–7)

External form. This sponge is highly distinctive and of invariable external form. Externally it is composed of three parts; an upper, cushion-like part; a middle main part; and a lower, root-like part to which an entangled spicule mass clings. The upper part of the sponge is rounded, cushion-like and flat, with a single oscule continuing to a cloaca at the center, and not provided with a spicular fringe under the cushion-like part, as is developed in other, related species. The main part of the sponge is depressed and ellipsoidal; and between this part and the upper part runs a single distinct groove. The diameter of the cushion-like part is almost equal to that of the main part. The sponge reaches 4–5 cm in total height and 3–5 cm in diameter, but young sponges are smaller. More than fifteen root-like processes develop downward from beneath the middle part; a tangled, dense spicule mass clings to these processes.

Color. Grayish white.

Skeleton. Radial spicule arrangement. Ectosome skeleton, of cushion-like upper part and middle main part, is formed with cladomes of dichotriaenes or occasionally with that of prototriaenes. Endosome skeleton of these part, with tract of oxea. Tract of oxea partially radiate to root-like processes which contain anatriaenes. Plesiasters and metastasters are densely packed over the whole of the sponge. The tangled spicule mass which clings to the root-like processes is mainly composed of anatriaenes, occasionally of oxea and dichotriaenes, and foreign materials such as spicules, detritus, horothurian spicules, etc.

Spicule. Oxeon, Prototriaene, Dichotriaene, Anatriaene Plesiaster, and Metaster.

Oxeon (Text-fig. 1, a)—Fusiform, gently curved, each end sharply pointed, and up to 3500 μm by 75 μm .

Prototriaene (Text-fig. 1, c)—With three similar, conical cladi, slightly undulating, each clad up to 400 μm long and 40 μm thick basally. Rhabdome tapering to sharply pointed end, up to 4500 μm long and 60 μm thick.

Dichotriaene (Text-fig. 1, b)—Cladome is usual form. Protocladi 250 μm long and 80 μm thick; deuterocladi conical, 700 μm long and 80 μm thick basally; and rhabdome straight or slightly undulating, up to 4500 μm long and 70 μm thick, and tapering to a sharply pointed end.

Anatriaene (Text-fig. 1, d)—Rhabdome very long, slender like a thread, with a sharply pointed end. Cladome with three similar, conical cladi recurving backwards and slightly outwards. Rhabdome more than 7000 μm long and 10–20 μm thick; too long to observe entire length on spicule mount. Conical cladi up to 150 μm long and up to 10 μm thick.

Plesiaster (Text-fig. 1, e)—Generally with four similar actines as calthrops, but occasionally number of actines varies from three to six. In most case these spicules are monocentral type, but in the case of spicules having number of actines other than four, the center tends to develop a slight spiral element. The length of each actine varies from 50 to 100 μm and the width from 7 to 10 μm .

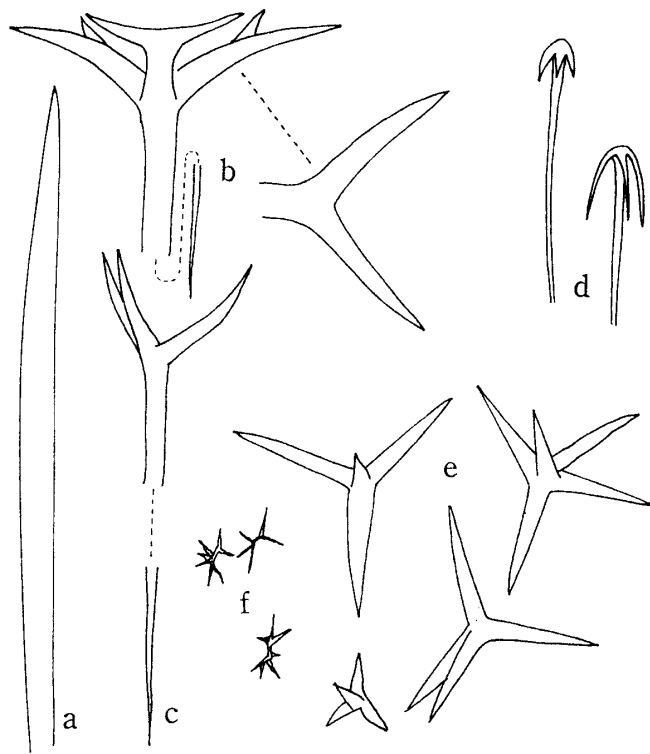
Metaster (Text-fig. 1, f; Pl. 7, figs. 6–7)—Axis very short, usually straight, with three to five actines at each end of axis, about 20 μm in total length, entire surface rough.

Remarks. The present species externally resembles *Thenia wyvilli* Sollas, 1886 from Philippine but clearly differs from the latter in two respect: 1) the present species has no spirasters as does *T. wyvilli*; and 2) it also has no somal anatriaenes. Furthermore, with respect to the external form *T. shimodensis* has a lesser developed cushion-like part than does *T. wyvilli* Sollas.

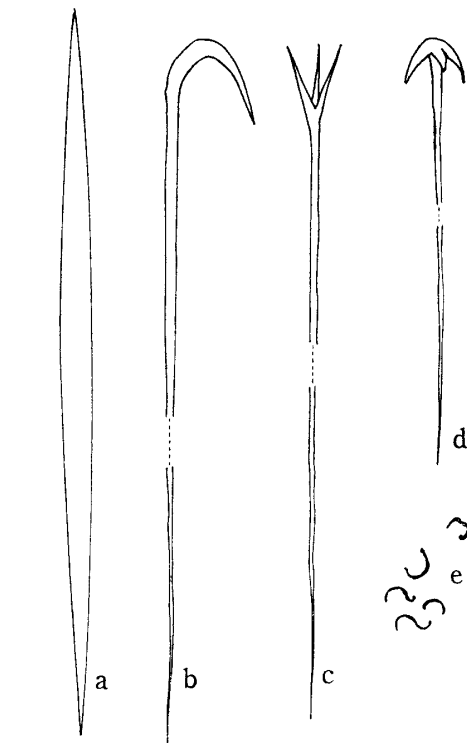
Locality and date collected. St. 11, 12, 15, 16, 17, 18 (Nov. 9, 1981), 24, 26, 28, 29, 30, 31 (Nov. 12, 1981).

Holotype. One specimen from St. 15, deposited in the Mukaishima Marine Biological Station (Specimen number: S-001).

Paratype. Two specimens from St. 15, deposited in the National Science Museum. (Registered number of NSMT-Po 1).



Text-fig. 1. Spicules of *Thenia shimodensis* n. sp. a, Oxeon, $\times 300$; b, Dichotriaene, $\times 200$; c, Protriaene, $\times 300$; d, Anatriaenes, $\times 200$; e, Plesiasters, $\times 400$; f, Metasters, $\times 400$.



Text-fig. 2. Spicules of *Craniella ellipsoida* n. sp. a, Oxeon, $\times 300$; b, Anamonaene, $\times 300$; c, Protriaene, $\times 300$; d, Anatriaene, $\times 300$; e, Sigmastiras, $\times 200$.

2. *Craniella ellipsoida* n. sp.

(Text-fig. 2; Pl. 7, figs. 8–9 and Pl. 8, figs. 1–7)

External form. more or less ellipsoidal, 1–3 cm in height, 0.7–2.5 cm in width, producing at the end opposite the oscule into several slender rootlets of up to 1 cm long, which are

attached by a tangled spicule mass. Surface even and minutely hispid over the entire surface of sponge but not markedly so. A single oscule opens near the top of the sponge.

Color. Greenish gray.

Skeleton. Typical radial arrangement. Oxea, anatriaenes and protriaenes densely and radially arranged from the central part of ellipsoid body. The cladomes of protriaenes arrange near ectosome and that of anamonaene do not reach to ectosome. The basal spicules' projection of rootlets and a radical, tangled spicule mass is composed mainly of anatriaenes and oxea.

Spicule. Oxeon, Anamonaene Protriaene, Anatriaene, and Sigmaspira.

Oxeon (Text-fig. 1, a)—Fusiform, straight to slightly arched, tapering from middle to each end. Each end sharply pointed, occasionally not so pointed. Size range. $630\text{--}1600 \times 13\text{--}30\ \mu\text{m}$.

Anamonaene (Text-fig. 1, b)—With recurved, long, single clad about $10\ \mu\text{m}$ in thickness. Rhabdome very long, thin, straight or curved or undulating. The thickness of rhabdome about $10\ \mu\text{m}$ near the clad and $1\text{--}2\ \mu\text{m}$ at the other part of length.

Protriaene (Text-fig. 1, c; Pl. 8, Fig. 7)—Each clad, similar to other cladi, straight, conical, sharply pointed, up to $100\ \mu\text{m}$ long and up to $7\text{--}8\ \mu\text{m}$ thick at its basal part near the rhabdome. Rhabdome, up to $3000\ \mu\text{m}$ long, up to $10\ \mu\text{m}$ thick; thickest in the middle of its length, tapering to each end, slightly thinning below cladome and at other end very thin, hair-like, and sharply pointed.

Anatriaene (Text-fig. 1, d; Pl. 8, fig. 6)—With three similar, short, recurved, conical cladi, each clad up to $70\ \mu\text{m}$ long. Rhabdome very long, about $10\ \mu\text{m}$ in thickness near cladome, and very thin throughout the rest of its length ($4\text{--}5\ \mu\text{m}$ thick near middle), up to $4000\ \mu\text{m}$ in length.

Sigmaspira (Text-fig. 1, e; Pl. 8, figs. 2–5)—Up to $10\ \mu\text{m}$ in distance across, C-shaped or slightly contorted S-shaped with incomplete single spiral of axis, with small conical spines over entire length.

Remarks. The present species resembles *Craniella globosa* var. *anamonaene* TANITA, which was reported by TANITA (1968) from the Ariake Sea. With respect to spiculation, both species have oxeon, anatriaene, protriaene and sigmaspira. Later this variety was reported by HOSHINO (1974) from the same area investigated by TANITA (1968). *Craniella globosa* Thiele, 1898 from Ohshima near Tango is lacking anamonaene. Among other members of the genus *Craniella*, the author does not know any species besides *Craniella globosa* var. *anamonaene* which has anamonaene forming the macrosclere. The author believes that a detailed external morphological comparison needs to be made between the present species and *Craniella globosa* var. *anamonaene* Tanita; however, the description provided by TANITA (1968) lacks morphological details except for the spiculation. Specimen which the author has identified as *Craniella globosa* var. *anamonaene* are clearly distinguished from the present species externally in that their surface appearance is very markedly hispid owing to the spicule projection from the surface which is dense and reaches to a few millimeters in length. A comparison of external features and spiculation between *Craniella ellipsoida* and *Craniella globosa* var. *anamonaene* of TANITA (1968) and HOSHINO (1974) is summarized in Table 2.

Locality and date collected. St. 11, 12, 15, 16, 17 (Nov. 9, 1981), 26, 29, 30, 31 (Nov. 12, 1981).

Holotype. One specimen from St. 15, deposited in the Mukaishima Marine Biological Station (Specimen number: S-002).

Paratype. Two specimen from St. 15, deposited in the National Science Museum (Registered number of NSMT-Po 2).

Table 2. Comparison of *Craniella ellipsoida* and *Craniella globosa* var. *anamonaene*.

	<i>C. ellipsoida</i>	<i>C. globosa</i> var. <i>anamonaene</i>	
		TANITA (1968)	HOSHINO (1974)
External form	ellipsoid, with radical rootlets		globular
Surface	hispid, with single oscule near the top		markedly hispid, with single oscule
Color	greenish gray		whitish gray
Spicule			
Oxeon	630–1600 × 1330 μ m	630–800 × 16–23 μ m 1800–2500 × 16–23 μ m	500–800 × 15–19 μ m 1500–3000 × 20–35 μ m
Anamonaene	up to 3 mm long	1.8 mm	2–3 mm
Protriaene	up to 3 mm long	2000–2600 × 16	2–3 mm
Anatriaene	up to 4 mm long	1.8 mm	more than 3 mm
Sigmaspira	up to 10 μ m	10–15 μ m	12 μ m

3. *Spirastrella panis* THIELE, 1898

(Text-fig. 3)

Spirastrella panis THIELE, 1898, p. 43, pl. 2, figs. 3–4, pl. 8, figs. 19 (a–d); HOSHINO, 1976, p. 253, pl. 4, figs. 24–26; HOSHINO, 1981, p. 224, fig. 13.

Spirastrella purpurea: VOSMAER, 1911, p. 24.

External form. Irregular massive or thick encrusting, 9 × 8 × 3 (thickness) cm. Surface uneven. Oscule and pore indistinct.

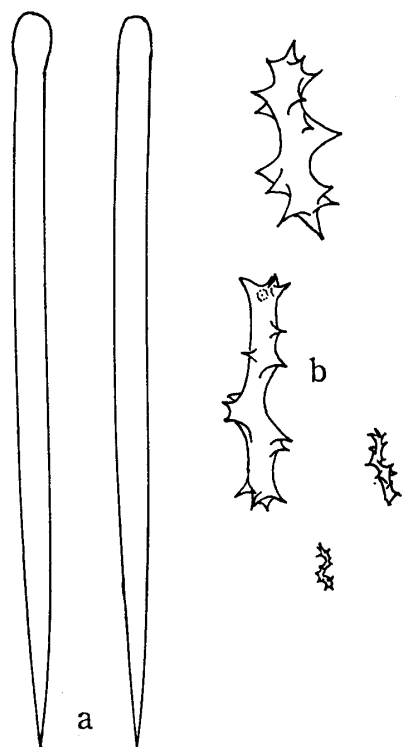
Color. Purplish brown.

Skeleton. Ectosome dense, tangential arrangement of subtylostyles in thickness equivalent to the length of ectosomal spicules, and dense arrangement of spirasters in thickness of 30–50 μ m over subtylostyle zone. Endosome an irregular reticulation of vague tracts of spicules, with confused spicule arrangement. Spirasters are densely found throughout the endosome, but regularly arranged along inner surface of aquiferous system.

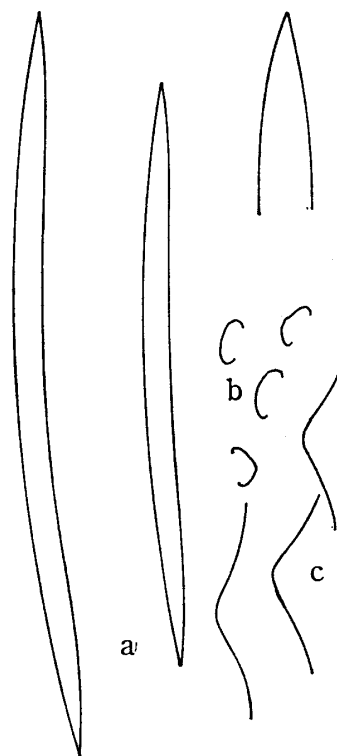
Spicule. Subtylostyle and Spiraster.

Subtylostyle (Text-fig. 3, a)—Straight or gently arched, base slightly swollen, other end tapering to point. Size range 220–300 × 7–9 μ m and 410–485 × 9–11 μ m. The small spicule in two categories is ectosomal subtylostyle and the large the endosomal.

Spiraster (Text-fig. 3, b)—25–50 μ m long, with one to three waves or spirals of axis, with conical spines spirally developed around the axis.



Text-fig. 3. Spicules of *Spirastrella panis* THIELE
a, Subtylostyles, $\times 200$; b, Spirastert, $\times 300$.



Text-fig. 4. Spicules of *Orina izuensis* n. sp.
a, Oxea, $\times 250$; b, Sigmata, $\times 200$;
c, Toxa, $\times 300$.

Locality and date collected. St. 4 (Oct. 19, 1981).

Distribution. Enoshima, Kushimoto, Mitsukue, Uchinoura (Sata Pen.), and Amani-Ohshima.

4. *Orina izuensis* n. sp.

(Text-fig. 4; Pl. 8, figs. 8–11)

External form. Generally ellipsoid, 2–5 cm high and 1–3 cm wide, or occasionally compressed in well-developed, large sponge, and with single long, slender, radical root, 2–5 mm thick and up to 7 cm long, extending from the basal part of ellipsoid body. Sponge surface not completely even, and pore indistinct. Single oscule opens at top of ellipsoid body.

Color. Dirty gray.

Skeleton. Of ellipsoid part is indistinguishable between ectosome and endosome. Irregular reticulation of tracts containing 5–50 rows of spicules, of 30–120 μm in diameter, with confused arrangement of spicules. Microscleres are found throughout the sponge. Skeleton of radical root is composed of numerous tracts densely packed with spicules; these tracts are attached with microscleres.

Spicule. Oxeon, Sigma and Toxon.

Oxeon (Text-fig. 4, a)—Hastate, straight to slightly arched, each end sharply pointed.

Size range $370-450-460 \times 8-15-16 \mu\text{m}$. Juvenile spicules fusiform, tapering to each end, the size smaller than that of fully-developed spicule described above.

Sigma (Text-fig. 4, b; Pl. 8, fig. 10)—Up to $20 \mu\text{m}$ across, slender C-shaped.

Toxon (Text-fig. 4, c; Pl. 8, fig. 11)—Up to $60 \mu\text{m}$ in length, entirely smooth and normal form.

Remarks. The present species is only the second record of a species belonging to the genus *Orina* from Japan.

Locality and date collected. St. 15, 16 (Nov. 9, 1981).

Holotype. One specimen from St. 15, deposited in the Mukaishima Marine Biological Station (Specimen number: S-003).

Paratype. Two specimens from St. 15, deposited in the National Science Museum (Registered number of NSMT-Po 3).

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要 約

伊豆半島の東岸沿岸でドレッジ採集を行った結果 Table 1 に示すように 13ヶ所の採集地点より尋常海綿が採集された。採集された尋常海綿の種数は 11 種であったが本報告では各地点より非常に多量に採れた 3 新種 *Thenia shimodensis* n. sp., *Craniella ellipsoidea* n. sp., *Orina izuensis* n. sp. と *Spirastrella panis* THIELE, 1898 の 4 種を記載した。*Thenia shimodensis* n. sp. はフィリピン産の近縁種 *Thenia wyvilli* SOLLAS, 1886 とよく似ているが spiraster と somal anatriaene を持たぬので容易に区別できる。*Craniella ellipsoidea* n. sp. は有明海産の *Craniella globosa* var. *anamonaene* TANITA, 1968 と骨片の構成はよく似ている。しかし TANITA (1968) の記載には外形の記録がないので HOSHINO (1974) が模式産地より再記載したものと比較すると体表に突出する骨片の密度・長さと色彩が明らかに異なる。*Orina izuensis* n. sp. は *Orina* 属としては本邦二番目の記録となる。*Spirastrella panis* THIELE, 1898 は VOSMAER (1911) によって *Spirastrella purpurea* (LAMARCK) にまとめられたが別種とすべきである。

Literature Cited

- CARTER, H. J., 1885. Report on a collection of marine sponges from Japan, made by Dr. ANDERSON, F. R. S., superintendent Indian Museum, Calcutta. *Ann. Mag. nat. Hist.*, (5), 15: 387-405.
 DÜDERLEIN, L., 1883. Studien an japanische Lithistiden. *Ziet. Wiss. Zool.*, 40: 62-104.
 HOSHINO, T., 1974. Demospondia of Hiryu-jima (Biro-jima), an islet in the Ariake Sea. *Calanus*, 4: 8-15.

- HOSHINO, T., 1976. Demosponges from the western coast of Kii Peninsula, Japan. *Zool. Mag.* (Tokyo), **85**: 248-261.
- HOSHINO, T., 1981. Shallow-water demosponges of Western Japan, I and II. *J. Sci. Hiroshima Univ. Ser. B, Div. 1*, **29**: 47-205+207-289.
- KADOTA, J., 1922. Observations on two new species of the genus *Reniera* of monaxonid sponges. *Zool. Mag.* (Tokyo), **34**: 700-711.
- LAMPE, W., 1886. Eine neue Tetractinellidenform mit radiaren Bau. *Arch. Naturgesch.*, **53**: 1-18.
- LEBWOHL, F., 1914a. Japanische Tetraxonida. I Sigmatophora und II. Astrophora metastrosa. *J. Coll. Sci. Imp. Univ. Tokyo*, **35** (2): 1-116.
- LEBWOHL, F., 1914b. Ditto. III. Euastrosa und IV. Sterrastrosa. *Ibid.*, **35** (5): 1-70.
- RIDLEY, S. O., & A. DENDY, 1887. Report on the Monaxonida collected by H. M. S. "Challenger", during the years 1873-'76. *Challenger Rep., Zool.*, **20**: 1-275.
- SOLLAS, W. J., 1888. Report on the Tetractinellida collected by H. M. S. "Challenger" during the years 1873-'76. *Challenger Rep., Zool.*, **25**: 1-458.
- TANITA, S., 1968. Sponge-fauna of the Ariake Sea. *Bull. Seikai Reg. Fish. Res. Lab.*, (21): 67-88.
- TANITA, S., 1970. Sponge-fauna of Sagami Bay, especially the Demospongiae. *Bull. Tohoku Reg. Fish. Res. Lab.*, (30): 87-97.
- THIELE, J., 1898. Studien über pazifische Spongien I. *Zoologica*, **24**: 1-72.
- TOPSENT, E., 1928. Eponges des Cotes du Japon. *Ann. Inst. Oceano.*, **6**: 297-319.
- TOPSENT, E., 1930. *Chondrocladia yatsui* n. sp., de la Baie de Sagami. *Annot. Zool. Japon.*, **12**: 421-432.
- VOSMAER, G. C. J., 1911. The porifera of the Siboga Expedition II, The genus *Spirastrella*. *Siboga-Expeditie*, **6** (A): 1-69.

Explanations of plates 7-8**Plate 7**

Figs. 1-7. *Thenia shimodensis* n. sp.

1. Collections from St. 15.
- 2-3. Entire sponge, side view, $\times 0.8$.
4. Entire sponge, top view, $\times 0.8$.
5. Transverse section of entire sponge, $\times 0.8$.
- 6-7. Metaster, $\times 300$.

Figs. 8-9. *Craniella ellipsoida* n. sp.

- 8-9. Entire sponge, $\times 0.8$.

Plate 8

Figs. 1-7. *Craniella ellipsoida* n. sp.

1. Transverse section of entire sponge, $\times 0.8$.
- 2-5. Sigmaspira, $\times 200$.
6. Cladome of anatriaene, $\times 200$.
7. Cladome of protriaene, $\times 200$.

Figs. 8-11. *Orina izuensis* n. sp.

8. Collections from St. 15.
9. Transverse section of entire sponge, $\times 0.8$.
10. Sigma, $\times 100$.
11. Toxon, $\times 100$.

HOSHINO: Demosponges from Izu Peninsula

Plate 7

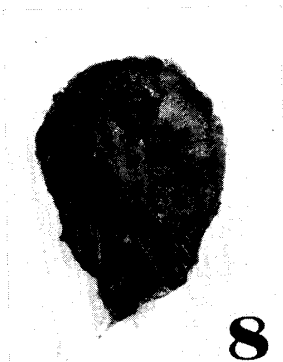
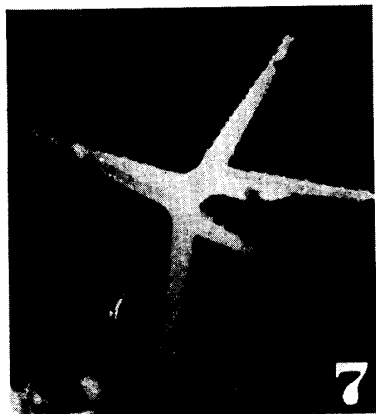
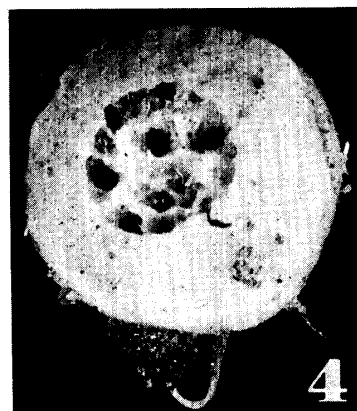
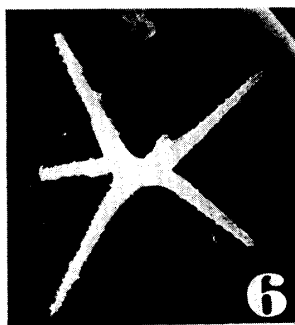
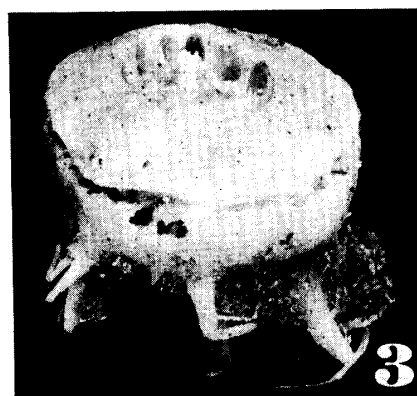


Plate 8

HOSHINO: Demosponges from Izu Peninsula

